

inhabitants has not appreciably diminished the stock. The land and the animals upon it are their birthright, and to interfere with it would surely cause trouble. We are not bound, however, to furnish them with civilised weapons, and every precaution should be taken to prevent their obtaining them.

Finally, the best of rules are useless without two things—a sound public opinion among the resident whites whom they chiefly affect, and a firm and knowledgeable man to carry them out. The first exists, and I am convinced is on the increase. How should it be otherwise, unless one presupposes the most shortsighted selfishness? As to enforcing the rules, that which is the business of several officials, all of whom are engaged in office work, is practically no one's business. Let there be one man on the spot—that is to say one in each great game district, and especially in each Reserve—whose duty it is to know and to act.

E. N. BUXTON.

NOTES.

As was announced in our last issue, many of the medical schools in London and elsewhere were re-opened this week, and addresses were delivered by well-known medical men and men of science. At the Charing Cross Hospital Medical School the third Huxley Lecture was delivered by Lord Lister on Tuesday.

A COURSE of twelve "Swiney" lectures on "Extinct and Persistent Types" will be delivered in the lecture theatre of the Victoria and Albert Museum, South Kensington, by Dr. R. H. Traquair, F.R.S., on Tuesdays, Wednesdays, and Fridays from October 9 to November 2. No charge is made for admission to the lectures.

At the meeting of the Royal Photographic Society to be held on Tuesday next, October 9, the President will deliver his annual address, and present the medals awarded at the Society's Exhibition.

THE Lettsomian lectures will be delivered before the Medical Society of London in March and April next, and the oration will be given in May by Mr. F. Richardson Cross.

THE seventeenth annual meeting of the Association of Official Agricultural Chemists is to be held at the Columbian University of Washington, commencing on Friday, November 16 next.

THE fourteenth International Medical Congress will be held at Madrid early in 1903, under the presidency of Prof. Julien Calleja.

THE annual "Fungus Foray" of the Essex Field Club will take place on Saturday next from High Beach, Epping Forest. The prospective arrangements of the club include the opening of the Essex Museum of Natural History by the Countess of Warwick, on the 18th inst. The scientific winter evening meetings will be resumed in the Physical Lecture Theatre of the West Ham Technical Institute on October 27.

Science announces that Prof. H. T. Todd, having reached the age limit, has retired from the Directorship of the U.S. Nautical Almanac. Prof. S. J. Brown, astronomical director of the U. S. Naval Observatory, has undertaken the duties of the office.

ACCORDING to the *Lancet*, a scheme has been sanctioned by the Charity Commissioners by which 644*l.* left to the Royal College of Surgeons of England in 1884 will be devoted to providing every four years a "Cartwright Medal" for an essay on dental surgery. The medal will be accompanied by an honorarium.

THE gold medal of the American Philosophical Society, known as the Magellanic, will be awarded in December next for the best discovery or most useful invention in the physical sciences brought before the Society before November 1.

NO. 1614, VOL. 62]

PROF. F. KLEIN has been awarded 800 marks by the Göttingen Society of Sciences for his *Mathematical Encyclopædia*, and the same society has awarded 500 marks to Prof. Wiecherts for that worker's seismological recording instruments.

IN addition to the medals and prizes given for communications discussed at the meetings of the Institution of Civil Engineers in the past session, the Institution has made a number of other awards in respect of other papers dealt with during the same period, *e.g.* a George Stephenson medal and a Telford premium to Mr. L. F. Vernon Harcourt, and Telford premiums to seven other gentlemen. For students' papers, the James Forrest medal and a Miller prize have been awarded to Mr. C. B. Fox, the James Prescott Joule medal and a Miller prize to Mr. J. W. Smith, and Miller prizes to four other students. The council have nominated Mr. R. F. Whitehead to the Palmer scholarship at the University of Cambridge in succession to Mr. A. H. Kirby.

A NEW technical school is to be erected in Belfast on a portion of the grounds purchased from the Royal Academical Institution, and a principal is to be appointed shortly at a salary of 600*l.* per annum, whose experienced practical advice will, it is hoped, be of much value in making the interior arrangements of the building, and in organising the work of the institution while the building operations are in progress.

PROPERTY valued at upwards of 200,000 dollars has been left by Mr. Charles H. Smith for the maintenance of the botanical specimens in the city park of Providence, Rhode Island.

WE have had pleasure on more than one occasion to refer to the good work that is being done to the cause of scientific education by the Essex Technical Instruction Committee, and are glad now to call attention to two new courses of lectures that are about to be inaugurated by the committee. A first-year's course of instruction in botany for teachers will commence at Chelmsford on Saturday, October 6, and will be continued on successive Saturdays until about the middle of May, 1901, and an elementary course of practical instruction in dairy bacteriology will commence on Thursday, October 11, and will be continued on ten consecutive Thursdays.

THE *Windward*, according to *Science*, was expected to reach St. John's by about the middle of September, but a short delay would not be surprising as the vessel started late, owing to some difficulty with the machinery, and was subsequently delayed by ice along the coast of Labrador. The arrival of the steamship is awaited with interest and some anxiety, as news will be brought, not only of the return of Peary, but also of Captain Sverdrup and Dr. Stein. The former has the *Fram* provisioned for five years, with a crew of twelve men. He planned to round the northern boundary of Greenland and to make his way down its unknown east coast to Cape Bismarck. It is said that the expedition under Dr. Robert Stein of the U.S. Geological Survey, who is accompanied by Mr. Leopold Kann, of Cornell University and Mr. Samuel Warmbath of Harvard University, was poorly equipped and left in a dangerous position. Lieut. Peary himself expected to establish his last depôt at Cape Hecla, the most northerly point of Grinnell Land just beyond the 82nd parallel, whence he intended to advance with Eskimo and sleds as far north as possible.

At a meeting held on June 12 last at the University o. Melbourne, it was unanimously resolved to form a society to be called the Society of Chemical Industry of Victoria, the objects for the establishment of the society being: (a) to afford its members opportunities of meeting and discussing matters connected with applied and industrial chemistry; (b) generally to advance the cause of chemical industry in Victoria. It was

further resolved that meetings shall be held at monthly intervals during the greater part of the year, at which papers on special branches of industrial chemistry are to be read and discussed. At a subsequent meeting, Prof. Orme Masson was elected president. The first paper to be read before the Society was one by Mr. D. Avery on September 4, on the cyanide process for gold extraction. The Society has made an encouraging start, as up to the end of August 118 members had been enrolled. We trust a lengthy and prosperous career lies before the new arrival.

THE sixteenth session of the Queensland branch of the Royal Geographical Society of Australasia was inaugurated at Brisbane on August 17, when a paper was read by the secretary—Mr. J. R. Thomson—on the geographical evolution of the Australian Continent. In connection with the society it has been decided to award a medal annually for the best and most scientific paper on some subject dealing with Queensland, and a fund for this purpose has been opened.

THE seventy-second annual meeting of the Association of German Naturalists and Physicians opened on September 17 at Aix-la-Chapelle with an attendance of about two thousand members. Of the thirty-eight sections, seventeen are devoted to such subjects as natural history, geology, geography, education, &c., the remaining twenty-one dealing with all the special subjects of medicine, including balneology, accidents, history of medicine and medical geography, and finally veterinary matters. A special correspondent of the *British Medical Journal* states that at the opening meeting the usual speeches of welcome were delivered by the Mayor and others, and the introductory addresses this year were by arrangement devoted, not only to giving a retrospect of the subject, but also to a sketch of its development during the nineteenth century. Dr. J. H. van 't Hoff spoke on the development of the exact natural sciences (natural history, chemistry and allied subjects). Dr. G. Hertwig delivered an address on the evolution of biology, in which, after relating anatomical discoveries, he came to the large question of the natural origin of the organic world. He considered that theories as to inheritance and natural selection still rested on the uncertain basis of hypothesis. He pointed out, however, that the difficulty arose from the absence of sufficient prehistoric records, and expressed his agreement with the opinion of Huxley that Darwin's teaching as to evolution will survive, apart from his principles of selection. Prof. Naunyn gave an address on the evolution of medicine, connecting the progress of the science with the names of Schwann, Pasteur, and Lister. The fourth and last address was given by Prof. Chiari, whose subject was the evolution of pathological anatomy.

THE British Mycological Society and the Cryptogamic Society of Scotland held a most successful meeting at the Boat of Garten from September 17 to 22. Various portions of the old forests of Rothiemurchus and Abernethy were worked from day to day, and a rich collection of scarce *Hydnei* and *Cortinari* was secured. Prof. Marshall Ward (President of the British Society) gave an address, entitled "Nutrition of Fungi," and also contributed a paper on "Naematelia." Exeter was selected as the centre for next year's foray in the last week in September, and Prof. Marshall Ward was re-elected President.

AT the annual meeting of the Hull Scientific and Field Naturalists' Club, on September 26, an active and successful year of work was reported. A committee has been formed to work in connection with the National Trust for Places of Historic Interest or Natural Beauty; several important "finds" have been made during the weekly excursions; an exhibition of local natural history, geological and archæological specimens

has been held in the Technical Schools; and the Club has become a Corresponding Society of the British Association.

EVERY one interested in astronomy will welcome the new publication *Astronomischer Jahresbericht*, the first volume of which, for the year 1899, has recently made its appearance. This important yearly volume is published by Herr Walter F. Wislicenus with the aid of the *Astronomischen Gesellschaft*, and printed in Berlin (Druck und Verlag von Georg Reimer, 1900, pp. 536). The object of this volume is to present to astronomical readers a brief summary of the contents of every publication, whether it be in book, article or pamphlet form, which treats of any matter connected with theoretical or practical astronomy, or with researches in astrophysics. The project is a great one, and with careful attention could be carried out successfully. This, the initial volume, reflects great credit on Herr Wislicenus, who, although associated with five other workers, seems to have laboured nobly and undertaken the greater part of the volume. The subject-matter is divided into four main sections, namely:—General and historical; astronomy, which includes spherical, orbit determinations, celestial mechanics, instruments and methods of observation, and, lastly, observations; astrophysics; and geodesy and nautical astronomy. The work is made complete by an excellent table of contents, and an index of names and the full titles of works referred to are given in each case. The author hopes that for future volumes he will have the help of all well-wishers of this work, and that such help will take the form of either references to published works or the works themselves, especially when they appear in transactions of societies which are published too late for insertion in the yearly volume, or other publications which are not specially devoted to astronomical matters. A glance at the present volume is sufficient to show the utility and value of this work, and it should be found in every astronomical observatory and laboratory.

QUOTING from the *Botanical Gazette*, *Science* says that the private herbarium of Mr. Harry N. Patterson, of Oquawka, Illinois, containing about 30,000 sheets, has been secured by the Field Columbian Museum, and will be installed as promptly as careful cataloguing will admit. The botanical department of the museum is, says our contemporary, to be congratulated upon this accession of one of the notable private herbaria of the country; one that will add a complete collection of Pringle's Mexican plants to its already excellent representation of the flora of that region and the Antillean islands. Mr. Patterson's herbarium is more or less contemporaneous with that of the late Mr. Bebb, which the museum secured some three years ago, and as Mr. Patterson made it his aim to secure a complete series of the species of North America, its addition to the collections of the museum will be of great value to botanical students and specialists in the west.

THE Royal Italian Institute of Military Geography has thoroughly revised the old map of the region round about Vesuvius, issued by the institute in 1876, on the scale of 1/10,000. It has also completed a new plan in relief of the cone of Vesuvius which has been subject in recent times to considerable changes in its configuration owing to the repeated eruptions. Both map and plan have been prepared under the direction of Prof. Matteucci, who for years has made a study of Vesuvius. The correction of the map has been rendered necessary, not only by the eruptions, but also by the number of new roads and buildings.

THE discovery of a new gutta-percha is reported from Zanzibar. This substance is derived from a tree which grows principally at Dunga. When tapped with a knife, a white fluid exudes, which, when placed in boiling water, coagulates into

a substance which in character bears a very striking resemblance to gutta-percha. As the material cools it becomes exceedingly hard, but while soft it can be moulded into any required shape. The fruit of the tree resembles a peach in shape, but grows to the size of a small melon. Experts have experimented with this new product to see if it in any way possesses the qualities of gutta-percha, and although it is not expected to prove equal to the genuine article, it is considered that it will be quite suitable for some purposes for which gutta-percha is at present utilised, and it will thus become a marketable article. It is said to abound in Zanzibar, and will be a very cheap product.

WRITING to the *British Medical Journal* on the subject of "Mosquitoes and Malaria," Mr. H. J. Elwes, F.R.S., says:—"The connection between mosquitoes and malaria seems to be now so clearly proved that some experiments should be undertaken by the Indian Medical Department to find out under what conditions mosquitoes do not produce malaria. Some years ago when on a hunting expedition in a very malarious district in the Bhotan Terai, I succeeded in escaping malaria by keeping within mosquito curtains till after sunrise, and getting into them again as soon as possible after dark, smoking freely at the same time within the curtains of my camp bed. Two out of the four Europeans of my party, and nearly all the natives who did not take these precautions, suffered so severely from malaria that our camp was unable to march after three weeks in the district. I may mention that it was then observed by experienced officers that from fourteen to eighteen days was the time which elapsed between exposure to infection and the appearance of severe fever. But there are places in Eastern Bengal and no doubt elsewhere where mosquitoes are very numerous and annoying, which do not seem to be subject to severe malaria, and I remember that Dacca, the only place where I was kept from sleeping a whole night by mosquitoes, was looked on as a station free from severe malaria, and I certainly, though I had previously been suffering from fever in Assam, never had a touch of it there. The great importance of finding out as soon as possible what precautions should be enforced by those responsible for the health of soldiers and others who are obliged to live in malarious districts cannot be overrated."

In his report on the work of the Government Laboratory, Dr. T. E. Thorpe refers to the examination of some ordinary writing ink which was submitted to him by the Stationery Office, on a complaint that it thickened excessively and clogged the pen, and, in illustration, a sample of the contents of the ink-wells in use in the particular public office was forwarded, together with a sample of the ink as supplied. It was found that after the deposition of the separated solid matter of the ink, collected from the ink-wells in use, the fluid portion had a specific gravity twice that of the ink supplied. In other words, the ink had been allowed to become concentrated by evaporation to practically double its original strength through the use of excessively large ink-wells and inattention to the supply. It is, of course, necessary that the ink supplied shall be capable of furnishing a record which may be relied upon as permanent. Ink made with tannin and iron salts has had the advantage of very extended and prolonged use, with the result that complete confidence is felt as to the permanence of writing, for which it is used. But ink of this character possesses the undoubted disadvantage that it rapidly thickens on exposure, and Dr. Thorpe points out that it is specially advisable that such ink should be used in ink-wells of small size which receive regular attention at short intervals.

It may safely be said that as petrol stands to-day as the paramount means of propulsion for automobiles accommodating passengers and of a light character, so steam has forced its way

(at least in this country) as the means adopted for heavy motor vehicles for road service, carrying a load varying from three to ten tons. In support of this argument, an interesting article is given in the *Engineering Magazine* for September, describing these heavier types of vehicles, and although all typical designs are mentioned in every case, not petrol, but steam, represents the power used. As can be well imagined, these heavier class of waggon have had many difficulties to overcome, and with the exception of one type, a ten ton steam motor waggon by Messrs. C. and A. Musker, of Liverpool, the general designs are practically the same. The Thorneycroft waggon is fully described and illustrated in its different applications, ranging from the tipping dust van to a steam delivery waggon, and provided with a "trailer," by which is meant a vehicle towed behind. The ratios of gearing between the engine and the driving axle are 10·1 and 17·7 to 1. On all ordinary gradients five or six tons can be taken, two of which are conveyed on the trailer. Several other waggons by different makers are illustrated, with their dimensions graphically stated. The chief differences lie in the position and type of the engine, the power transmitted to the driving wheels in different ways, various kinds of boilers and different working pressures employed, and slight external appearance. The "Musker," already referred to, is only in its experimental stage, its chief features being an efficient liquid fuel burner combined with a flash-type boiler built up of three cylindrical coils of strong steel tubes, and the flame circulating in the annular space between them. All machinery is placed beneath the "body," thus affording a larger loading area than any other vehicle. It remains to be seen, however, whether the advantage claimed will be realised; if so, and considering its great load capacity (ten tons), it is indeed an important step in this branch of engineering.

A REPORT on the geology of the West Moreton or Ipswich coal-field in Queensland, by Mr. W. E. Cameron, has been published at the Geological Survey Office, Brisbane. It is accompanied by an appendix on the economic value of Queensland coal by Mr. Robert Wilson. The Ipswich coal-field is estimated to cover an area of about 12,000 square miles, and the coal has been most extensively worked in the neighbourhood of the town of Ipswich, which is about twenty-five miles south-west of Brisbane. The strata are of Jura-Trias age, and they are a good deal folded and faulted. They yield workable coals from two to four feet and more in thickness. Experiments made on the Government steamer *Otter* by Mr. Wilson show that some varieties are very good and useful steaming coals; and that generally the coals of Queensland "are well able to hold their own with any others at present found in Australia." The report is illustrated by a detailed geological map on a scale of an inch to twenty chains, and also by a geological map of a large area on the scale of an inch to a mile.

THE third volume of the *Annales* of the French Meteorological Office, containing rainfall values and completing the observations for the year 1897 (see p. 490), has been published in a greatly reduced form. The daily rainfall values are given for three hundred stations only, instead of nine hundred, and the scale of the rainfall charts has also been reduced. The valuable series of monthly and annual summaries are given for all stations, as before.

In the *Botanical Gazette* for August, Prof. D. G. Fairchild is enthusiastic as to the advantages presented by the Botanic Garden at Rio de Janeiro for the study of tropical botany, although at present no facilities are afforded for teaching or study. He regards Rio, with its fashionable suburb Petropolis, as the most picturesque city in South America. To any botanist who wishes to study tropical vegetation, Petropolis and the other suburbs of Rio will prove the most attractive place in the

world. As compared with the mountains of Java or Sumatra, they are civilised, and have a much more salubrious climate and all the conveniences of modern civilised life. The south island of Hawaii or the South Pacific Islands have no such stretches of virgin forest, or such a flora or fauna; to explore Ceylon is hot and uncomfortable in comparison; and the mountains of Jamaica and Trinidad are uninhabited except by scattered planters. Prof. Fairchild reckons the hotel expenses at Petropolis as about two dollars *per diem*.

FREQUENT as earthquakes are in the Philippine Islands, those of the year 1897, being unusual both in number and in violence, form the subject of an important memoir by P. José Coronas, which we have just received from the Observatory of Manila. He estimates the total number of shocks at 307, occurring in 108 groups. No part of the archipelago was entirely free from earthquakes, though less than five were felt in Mindoro, Paragua and the central part of Luzon. In the north-east of Samar, where more than a hundred were felt, they were most frequent and most destructive. Full descriptions are given of the three most important earthquakes—those of Luzon, on August 15; Zamboanga, on September 21, with the accompanying sea-waves and long series of after-shocks; and Samar, on October 19–20. Four of these earthquakes were recorded at distant stations, both Shide and Edinburgh being more than 11,000 kms. from the origins. The mean velocities of the waves of the two principal Zamboanga earthquakes are estimated at 8.7 and 8.1 kms. per second along the surface, or 7.6 and 7.1 kms. per second along the chords.

DETERMINATIONS of the rate of increase of underground temperature, apart from their scientific interest, have an important practical application in fixing the limit of depth at which mining operations can be carried on successfully. In this connection a report has been lately issued by the Department of Mines of the Government of Victoria, dealing with observations of underground temperature at Bendigo, the author being Mr. James Stirling, Government Geologist. The rise of temperature of the rocks with the depth varies in different parts of the earth's surface, thus making it difficult in any mining district to determine what the rate of increase is without actual experiment. Thus, if we accepted the hitherto recognised formula for the Bendigo field of 1° Fahr. for every 60 feet in depth, we should have a temperature of 125° at the 3,500 feet level. The observations already made prove that this temperature is not reached. It has been asserted in some quarters that mining might extend to as great a depth as 10,000 feet, if the difficulties of haulage could be overcome; but when we consider the effect of compressing the air at such a depth (*i.e.* the compression caused by its own weight), it will be seen that ventilation under ordinary conditions would be practically unattainable. At a depth of 10,000 feet the ventilating current entering the shaft at, say, a temperature of 60° Fahr., would attain a temperature of 90° by its own weight, altogether apart from the additional heat acquired by contact of the air with the heated rock surfaces. It is possible, however, to imagine a limit of 5000 feet as a workable depth, although the present observations as to the normal rate of increase of temperature of the rocks at Bendigo— 1° Fahr. for every 135 feet—suggest 4000 feet as a convenient practical limit to healthy working. Mr. Stirling's report is accompanied by charts illustrating the temperature and pressure gradients in No. 180 mine. In connection with the composition of the air, Mr. Stirling calls attention to the very defective ventilation of many mines, and to the necessity of owners and directors of mines taking steps to remedy the existing evils.

IN NATURE, vol. lix. p. 133, we briefly referred to the very interesting investigations of MM. Hildébrandsson and Teisserenc de Bort into the history and present conditions of dynamical

meteorology. Part ii. of this important work has now been issued, dealing generally with revolving storms, and the organisation of the international meteorological services, and particularly with the parts taken by Le Verrier, FitzRoy, and Buys Ballot, and reproducing specimens of the earliest reports and charts issued by each. Le Verrier seems to have been the first in Europe to conceive the idea of telegraphic weather forecasts, although, owing to inadequate support, he was the last of the three to introduce a regular working service. It is interesting to read, thirty-five years after the death of Admiral FitzRoy, the judgment of the eminent authors upon his work in this country, viz. that the criticism of his weather service was both severe and unjust, and Le Verrier's opinion is quoted that if he did not arrive at sufficiently practical results, probably on account of the limited area dealt with, no one else in his place could have done better. In another chapter, dealing with the fundamental works in the different countries between 1865 and 1872, the laborious investigations of Dr. Buchan occupy a prominent place. The publication of his remarkable memoirs and charts at this early epoch were of the highest importance in the development of dynamical meteorology, and the early researches made subsequently in other countries have been, to a great extent, simply verifications of his ideas. The Storm Atlas of Prof. Mohn, the present chief of the Norwegian Meteorological Service, the publications of the Meteorological Office, and the Synoptic Charts of the late Captain Hoffmeyer and of the Copenhagen and Hamburg institutes, are also specially referred to as having contributed greatly to the development of meteorological science.

THE remarkable colour-changes exhibited by a familiar prawn (*Hippolyte varians*) form the subject of an extremely interesting and most beautifully illustrated paper by Dr. Gamble and Mr. Keeble, which appears in the *Quarterly Journal of Microscopical Science* for September. The species in question may be met with commonly in the lower tidal pools along the shore, or may be obtained by trawling in deeper water. It has long been known that different individuals exhibit variations in colour ranging from one end of the spectrum to the other, and also that many specimens display a protective resemblance to the particular seaweeds on which they may be resting. It is now demonstrated that all the different colour-variations are capable of passing into one another, and the protective resemblances of individuals to their environment are most admirably displayed in the coloured plates with which the paper is illustrated. But this is not all. Twice during the twenty-four hours every specimen is living in deeper water than ordinary, and this includes a certain change in coloration to harmonise with the stronger or weaker light. But a much more important colour-change is induced by the daily alternation of light and darkness, and as the shades of evening approach every single individual of the species gradually loses its distinctive diurnal hue and becomes of a full transparent azure blue. The change is heralded by a reddish glow followed by a green tinge, which finally melts into the azure. And it is not a little remarkable that the day-and-night change has been so long established that it has become periodic and occurs whether the specimens are kept in perpetual darkness or *vice versa*.

To the same journal Monsieur E. L. Bouvier communicates a supplemental paper on the results of his examination of the series of examples of *Peripatus* in the British Museum. He deals especially with the specimens described as *P. jamaicensis*, which are shown to include two perfectly distinct species.

OUR German contemporary, *Naturwissenschaftliche Wochenschrift*, of September 23, contains a long digest of Prof. G. Siebert's translation of Lydekker's "Geographical History of Mammals," which was published so long ago as 1897.

THE additions to the Zoological Society's Gardens during the past week include two Macaque Monkeys (*Macacus cynomolgus*) from India, presented respectively by Mrs. Woods and Mrs. Sassoon; a Plantain Squirrel (*Sciurus plantani*) from Java, a Vulpine Phalanger (*Trichosurus vulpecula*) from Australia, presented by Mrs. A. Jeffrey; a Ground Hornbill (*Bucorvus abyssinicus*), a Bell's Cinixys (*Cinixys belliana*) from West Africa, presented by Mr. Henry Strachan; a Peregrine Falcon (*Falco peregrinus*), European, presented by Mr. W. R. Bryden; a Brazilian Tapir (*Tapirus americanus*), two Snowy Egrets (*Ardea candidissima*), six Ring-necked Lizards (*Tropidurus torquatus*), three Surinam Lizards (*Ameiva surinamensis*), a Lizard (*Crocodilurus lacertinus*), two Tuberculated Iguanas (*Iguana tuberculata*), six Giant Toads (*Bufo marinus*) from Para, presented by Captain A. Pam; a Vivacious Snake (*Tarbophis fallax*), European, presented by Mr. W. H. St. Quintin; a Spix's Macaw (*Cyanopsittacus spixi*) from Brazil, a Large Grieved Tortoise (*Podocnemis expansa*) from the Amazons, six Florida Tortoises (*Testudo polyphemus*) from North America, four Elegant Snakes (*Tropidonotus ordinatus infernalis*), four Couch's Snakes (*Tropidonotus ordinatus couchi*) from California, deposited; a Bristly Ground Squirrel (*Xerus setosus*) from South Africa, a Pink-headed Duck (*Rhodonessa caryophyllacea*) from India, purchased.

OUR ASTRONOMICAL COLUMN

EPHEMERIS FOR OBSERVATIONS OF EROS:—

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THE ROYAL PHOTOGRAPHIC SOCIETY'S EXHIBITION.

THE Royal Photographic Society hold their annual exhibition this year in the New Gallery, Regent Street, instead of, as heretofore, at the Water Colour Society's Gallery in Pall Mall. The result of the change to the larger galleries is certainly a matter for congratulation, because the very restricted accommodation of previous years crowded out professional and trade work, and gave very little space indeed for the exhibition of scientific and technical photography. This year, if any branch of photography is not represented, it is because of other difficulties than want of space. The only notable omission that occurs to us is that of cinematography, and this is accounted for by the very stringent regulations now enforced making a practical demonstration impossible.

The pictorial section occupies about as much of the walls as usual, and the greater part of the remaining space is taken up by professional and trade work, and apparatus exhibits, many of which, however, are not entirely devoid of scientific interest. But upstairs, in the gallery that runs round the central hall, there will be found a very excellent collection of "scientific, technical and photomechanical exhibits."

The Royal Observatory, Greenwich, contribute some of their most recent work with the 30-inch reflector, the 26-inch Thompson photographic refractor and other instruments. The photograph of the great nebula in Orion, taken last December, appears to be especially noteworthy. Two plates of the planet Eros are shown. A photograph of ξ Ursæ Majoris, taken with the 28-inch equatorial, the object-glass being corrected for photography by the separation of the lenses and reversal of the crown lens, as proposed by Sir G. G. Stokes, testifies to the value of this method of correction. Examples of work with the occulting shutter and several recent eclipse photographs will be

examined with interest. Among several other astronomical photographs may be mentioned a paper enlargement of very considerable dimensions of the transit of Venus in 1882, by Prof. David P. Todd, and a series of photographs by the Rev. John M. Bacon illustrating his balloon ascent to search for the Leonids last November.

There are several contributions of photomicrographs. As examples of skill in this direction, the series by Mr. E. M. Nelson, of diatoms, exhibited by the Royal Microscopical Society, will probably attract the most attention. The natural history and biological photographs of all kinds are too numerous to refer to in detail. As notable illustrations of the value of a series of photographs illustrating biological changes, the sixteen lantern slides, by Mr. Martin F. Woodward, from his photomicrographs, showing the fertilisation and segmentation of the egg of *Ascaris megaloccephala*, and a frame of photographs, by Mr. Edgar Scamell, showing the different stages in the growth of a nasturtium, will well repay careful study. The photographs in the latter series are so numerous that they would almost serve to illustrate the growth of the plant as a "living picture" by means of a cinematograph. It is very usual to slow down a rapid movement that its details may be recognised, and there is doubtless much to be learnt from the representation in a few seconds of changes that naturally require days or even weeks for their completion.

The applications of photography in many other directions are well illustrated. The automatic recording of the variations of scientific instruments, spectroscopic work, surveying, mining, engineering, the production of metal reliefs, are a few of the subjects that occur to us. Dr. W. J. Russell shows prints to illustrate the photographic activity of the radiations from "the metals radium and polonium," and also from uranium salts, which he finds do not lose any of their activity by keeping them for three years in the dark.

Photography itself, as distinguished from its applications, has received considerable attention, and we would point out that if exhibits of this character could be kept together in future exhibitions, it would much facilitate their study. A print from the enlargement (four thousand diameters), by Dr. Neuhaus, of a section of a film of a Lippmann interference photograph, copies of which have already been seen here, is exhibited by the doctor himself, and shows very clearly that the silver is deposited in layers, as the theory of the process indicates. Several examples of the Lippmann process may be seen in another part of the exhibition. An interesting demonstration of the possible range of exposure is given by the Kodak Company. They show seven negatives exposed under the same conditions, but for periods of from one to fifty, all of which were developed for the same length of time in the same developer. The longer the exposure the denser the negative, but the prints from them are scarcely distinguishable from one another. They show clearly that a small variation in exposure, or even none at all, will serve for very different subjects if negatives of various densities are not objected to.

Mr. Thomas Manly, the inventor of the "Ozotype" process of pigment printing, shows some examples of his method, one of which was exposed and washed thirteen months before the pigment was applied to it, proving that the power of the exposed bichromated paper to render gelatine insoluble and so fix the pigment does not sensibly change by keeping it. The process which in this country has hitherto been associated with Prof. Joly's name is illustrated by the Colour-photo Company of Chicago, and called the "McDonough-Joly process," referring to Mr. McDonough, who worked out the method in America simultaneously with Dr. Joly. They show that there is still room for improvement in the ruling of the triple coloured lines, and also in the nearer approximation of the photographic plate and the coloured screen. By looking at various angles across the ruling, the colour of the different parts of many of the pictures alternate between green, red and blue. This, we take it, is due to the distance between the colour screen and the photographic plate. Mr. Sanger Shepherd shows some striking examples of his triple film three-colour photographs.

The most notable novelty in apparatus is the "panoram kodak," for which the Kodak Company have been awarded a medal. All forms of projection have their advantages and their disadvantages. By adopting the cylindrical or panoramic perspective, many subjects are possible for photography that could not be rendered by the plane perspective given by the ordinary fixed lens and plate. The arrangements necessary for a rotating